A Sarcoptes of a Bat

BY

Dr. A. C. OUDEMANS.

with Plate 11.

From Mr. S. A. POPPE in Vegesack, Bremen, I received some time ago a few tubes with *Acari* with the request to determine them. The tubes contained 18 well known species, but one of the tubes with *Acari* found on a bat, *Vespertilio murinus*, contained some curious globular bodies with a piece of dark coloured membrane adhering to them. With an ordinary magnifying glass I detected that these bodies were parasites which had burrowed themselves into the membrane, the hole through which they made their entrance being still visible (see Plate 11. fig. 1), and once between the two lamellae of the membrane they were swollen by sucking the blood or lymphatic fluid of the bat. The edges of the hole mentioned above were dark coloured, nearly black, as if burnt by heat and turned somewhat upwards.

Fig. 2. When I returned this curious body, I saw the underside coloured much lighter, yellowish brown, and I could distinctly discern numerous ovoid whity spots, which afterwards proved to be eggs.

Fig. 3. Seen from the side, the lens-shaped body appeared to be exactly in the middle of the membrane, so that the membrane, which was cut with a pair of scissors all around it, surrounded it like the ring surrounds Saturn. The edges of the hole are distinctly seen turned a little upwards.

With very fine steel needles I succeeded in tearing the upper

lamella into pieces and in delivering the parisite from its narrow prison. But at the same time nearly a hundred very little quite white eggs came to light.

Fig. 4. With a ten-times linear magnifying glass and on a black underground the parasite appeared to be nearly circular, for the greater part yellowish brown and with a very little head, or what seemed to be a head, and with regularly arranged dark brown figures.

Fig. 5. Turned on its back, the underside or ventral side appeared to be nearly flat, with lighter colours than on the dorsal side, being here nearly as yellow as butter and having cocoa-brown spots.

Fig. 6 shows us that the animal is nearly half as high as its body-length. Legs were apparently absent. The head is situated higher than the ventral surface.

I could not yet observe what animal it was, but from the shape of the numerous eggs I supposed it might be a kind of *Sarcoptes.* I examined the further contents of the empty prison and those of my hollow glass cube in which I had prepared the animal in question. I happily found three larvae which I immediately recognized as larvae of a kind of *Sarcoptes.*

I instantly wrote to Mr. Poppe that I had found in one of his tubes pieces of a membrane, apparently originating from the patagium of *Vespertilio murinus*, with globular bodies, which prooved to be footless Sarcoptides, and asked him whether he might still remember from what locality these bodies originated. Mr. Poppe kindly answered me that according to his memory he had cut these bodies from the ears of the bat and that he has often observed such bodies there.

Fig. 7. Meanwhile I had made transparent by glycerine a full grown Sarcoptes, which I have delineated, magnified 44 times in fig. 7. The figure now distinctly shows four legs, two on both sides of the head. The legs do remind those of *Knemidocoptes mutans* Robin and *K. fossor* Ehlers. Somewhat behind the head, nearly two times its own length, two very little spots are visible,

implantations of a very small hair, and on the hind part of the body nearly in the centre of the back, a brown edged split, which prooved to be the anus. A dorsal anus, like in *Notoedrus cati* Hering!

Fig. 8. Another specimen, though smaller, prepared from its enclosure and treated with caustic kali, showed me that the animal's hind legs have peculiarities yet unknown too in *Psoricae*, viz. the third pair of legs has no ambulacrum nor a long hair, whilst the fourth pair is provided with a long hair, whereas it is destitute of an ambulacrum. The epimera are distinctly visible, and quite behind those of the four fore-legs the skin shows transverse wrinkles; here I suppose is situated the female genital opening. Four hairs are visible on the ventral surface, one before each leg of the third pair and one between the third and fourth pair of legs.

Fig. 9. On the dorsal surface we observe two spots of implantations of very little hairs not far from the head, which were already discernable when the animal had not yet been treated with caustic kali (see fig. 7). Further the anus, surrounded by six pairs of very minute hairs, and a little behind the anus one single hair, at least three times larger than the foregoing ones. Then, on a level between the anus and this last hair, we observe on both sides again three hairs, as minute as the other ones. On both sides of the body a long cloud of very minute points is only discernable by exactly focussing the microscope.

Fig. 10. With high magnifying powers the clouds prove to be triangular spines, a common appearance in *Psoricae*, but the kind of dispersion of these spines on the body of the animal is at least unknown in this group.

Fig. 11. When we behold the head and the two pairs of fore-legs with a strongly magnifying glass, we distinctly discern that the epimera of the first pair of legs coalesce in the median line, whilst those of the second pair of legs are free, showing a less chitinized inner blade projecting inwards. The first and second joint of each leg is tolerably short, but the third, fourth and fifth joint is extremely short and not distinguishable one from another. Each

leg (I purposely don't say the last joint) bears at least five claws, of which three larger and two shorter; two of the three large ones are hyalin, whilst the other three claws are brown, chitinized. The right leg of the second pair (to the left of our figure), shows still a blunt ended short hair, characteristic in *Psoricae*, so we must conclude that this hair is present on all the four fore legs, at least on those of the second pair. The chitinized ring of the first joint of all the four forelegs shows a short hair directed forewards, as the bases of the palpae also have. The first joint of the (immovable?) palpae also shows such a hair. The rigth mandible is projecting out from the mouth; this mandible has the common form.

Fig. 12 and 13. Each third leg shows five (or six?) claws, but apparently (see fig. 13) two claws are inserted on the last joint whilst the other three claws belong to the second, third and fourth joint. A short blunt ending hair, as in the legs of the second pair, is implanted on the third (or fourth) joint. The hair before the third leg is a true hair, that between the third and the fourth leg is lanceolated (see fig. 12).

Fig. 14. The fourth leg has only two claws on its last joint, which moreover bears a long flexible hair, as long as the leg itself with its epimeron.

Fig. 15 and 16. The eggs are ellipsoidical with two different axes. In many of them larvae *in situ* are distinct, with the hair of the third legs crossed on the ventral surface.

Fig. 17. The larva has a nearly quadrangular form. The anterior margin is, however, rounded, and the animals being invariably well fed, does show several lobes on this margin, as well as on the posterior one. The skin is wrinkled as in other *Psoricae*. The direction of these minute wrinkles is better shown in my figure than described. In general the wrinkles run parallel to the margins, but on the very dorsal surface they run transversally. The anus is situated on the last fourth part of the notogaster. Two flexible hairs are situated between the first and second fourth part of the notogaster; two blunt bar-shaped hairs near the margin between the fore and hind half of the notogaster, and six smaller

bar-shaped hairs on each side of the anus. In a few specimens these 12 hairs were directed to the median line and completely covered the anus.

On comparing figure 17 with fig. 9 we observe that the two flexible hairs correspond with the two little hairs of the adult female just behind the head, that the twelve bar-shaped hairs surrounding the anus correspond with the twelve exceedingly minute hairs near the anus of the adult female, and that the two long bar-shaped hairs have disappeared in the adult female.

Moreover the adult female shows on its posterior part behind the level of the anus seven hairs for which we in vain seek in the larva. The skin of the adult is as smooth as a mirror, whilst that of the larva — at least on its dorsal surface — is wrinkled. The skin of the larva does not appear to have any triangular spines, whereas that of the adult female shows two large masses of them.

The « cheeks » of the larva show a segmentation in three joints. The second and third joints of the palpae each bear a little hair. Each joint of each leg bears a hair; the last joint moreover a strong and short claw and a pedunculated ambulacrum.

The hind (third pair of) legs of the larva seems to be composed only of four joints (see fig. 18), the last of which has a very long and flexible hair, a very short one and a strong claw.

Fig. 18. The epimera of the first pair of legs touch one another in the median line, do not, however, coalesce. On the ventral surface we distinctly discern that the legs of the first and second pair consist of five joints. The skin here is smooth and quite destitute of hairs.

Nymphae and males were unfortunately absent.

Biological notes. The first fact which does astonish us is that the animal, though provided with such formidable digging instruments does not burrow holes; indeed it seems to remain invariably on the same spot.

The second fact is, that such an animal lives in the very delicate membranaceous ears of the bat, instead of in horny scales of the

legs of fowl. Or, better said, that a parasite living between the two skins which compose the membrane of the ear of the bat, is provided with such enormously developed diggingapparates on all its legs.

At present I don't believe that any Sarcoptide is known to science, which may so unusually swell as our present species. It remembers the *Ixodidae!*

One should say that the body is studded with eggs, like in *Canestrinia Giardi* TROUESS. (one of the *Acaridiae Insecticolae*) or in *Pediculoides ventricosus* NEWP. (one of the *Tarsonemini*). This, however, is not the case! In the specimen figured in fig. 8 and 9 I only found two membranes of mature eggs, in another also two and in a third only one. Relying upon the enormous black or better untransparent masses (see fig. 7) filling the body, I suppose that the animal really feeds on great quantities of blood, and not, as is generally adopted from *Psoricae*, of lymphatic fluid, or serum.

Further we may safely conclude that the animal once burrowed between the two skins of the ear of the bat, is obliged to enlarge constantly its prison, and as it constantly remains on the same spot too, it is obliged to turn round its vertical axis in order to destroy continually round its body, consequently spirally, the connective tissue between the two skins of the ear of the bat.

An unusual phenomenon strengthens this my supposition. It is that the opening through which the animal has entered its prison is constantly found exactly in the middle of the circumference of the animal's back. And further it is that the animal's prison or habitation contained nothing else but the animal itself and its eggs, abandoning the three or four larvae, which apparently were seeking for the outlet. No excrements at all could be detected. This now is easily interpreted. The animal's anus being constantly at the outlet, the excrements are removed piece by piece by the wind blowing into the outlet during the bat's flying, or by the shaking movements of the ear, when the bat is fluttering through the air, or by the sweeping back movement of the ear when the bat is cleaning it with its thumb.

Measurements:

Length of egg.	170	mikrons.
Breadth of ditto	120	»
Length of larva	173	»
Breadth of ditto	124	»
Length of full grown female delineated in fig. 7	1383	»
Breadth of ditto	1170	»

Comparison with other itch mites. That we have here to do with a true Sarcoptide, is prooved by the shape of the eggs, by the shape and particularities of the larvae, and by those of the adult female, by the presence of epimera, by the legs with five joints and by the chelate mandibles.

As the posterior legs are subabdominal, it agrees more with *Sarcoptes* LATR. *sensu lato*, than with *Psoroptes* GERV. and *Chorioptes* GERV. As males are unknown, nothing can be said of genital suckers nor of abdominal appendages.

It agrees with *Sarcoptes* LATR. *sensu stricto* by having 1° triangular protuberances on the skin of its back; 2° its fourth pair of legs ending in a long flexible hair; 3° the anus surrounded by at least 6 pairs of hairs, 4° the epimera of the first pair of legs coalesced together. In all the other generic characters it differs from *Sarcoptes*.

It agrees with *Notoedrus* RAIL. by having 1° the anus quite dorsally, 2° its fourth pair of legs ending in a long flexible hair, 3° the epimera of the first pair of legs coalesced together. In all the other generic characters it differs from *Notoedrus*.

It agrees with *Knemidocoptes* FÜRST. by having 1° the first and second pair of legs not provided with ambulacra, but only with strong claws, 2° the third pair of legs not provided with a long hair. In all the other generic characters it differs from *Knemidocoptes*.

For the present animal therefore which, as is shown above, cannot be placed into one of the genera adopted hitherto, without changing their diagnoses, I propose the generic name of

NYCTERIDOCOPTES,

from νυκτερίς, a bat, and κόπτω, I bite or I wound; and I should wish to call the species:

Nycteridocoptes Poppei,

dedicating it to the zealous and infatigable investigator of parasitic Acari, who procured it to me.

Arnhem,
June 22, 1897.